

What is claimed is:

1. A 3-5 group compound semiconductor comprising a GaAs substrate, a buffer layer on said GaAs substrate and an epitaxial crystal layer on said buffer layer, said layers being formed by an epitaxial crystal growth method, wherein

said buffer layer and said epitaxial crystal layer on said buffer layer are 3-5 group compound semiconductors each independently represented by the general formula $\text{In}_x\text{Ga}_y\text{Al}_z\text{As}$ (wherein, $0 \leq x \leq 1$, $0 \leq y \leq 1$, $0 \leq z \leq 1$, $x+y+z=1$), and the dislocation density in the epitaxial crystal layer on said buffer layer is $2000/\text{cm}^2$ or less.

2. A 3-5 group compound semiconductor comprising a GaAs substrate, a buffer layer on said GaAs substrate and an epitaxial crystal layer on said buffer layer, said layers being formed by an epitaxial crystal growth method, wherein

said buffer layer and said epitaxial crystal layer on said buffer layer are 3-5 group compound semiconductors each independently represented by the general formula $\text{In}_x\text{Ga}_y\text{Al}_z\text{As}$ (wherein, $0 \leq x \leq 1$, $0 \leq y \leq 1$, $0 \leq z \leq 1$, $x+y+z=1$), and the dislocation density in said epitaxial crystal layer on the buffer layer is $1/3$ or less of the dislocation density in said GaAs substrate.

3. The 3-5 group compound semiconductor according to Claim 1 or 2 wherein said buffer layer has a structure formed by

laminating at least two kinds of layers having different compositions, for n ($1 \leq n \leq 30$) times.

4. The 3-5 group compound semiconductor according to Claim 3 wherein said two kinds of layers are a $\text{Ga}_{1-z}\text{Al}_z\text{As}$ layer (wherein, $0 < z \leq 1$) and a GaAs layer.

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5. The 3-5 group compound semiconductor according to Claim wherein the value of said z is 0.01 or more and 0.4 or less.

6. The 3-5 group compound semiconductor according to Claim 3 wherein at least one layer of said two kinds of layers is doped with an n-type dopant.

7. The 3-5 group compound semiconductor according to Claim 6 wherein said n-type dopant is Si and the concentration of this Si is $1 \times 10^{17} \text{ cm}^{-3}$ or more and $5 \times 10^{18} \text{ cm}^{-3}$ or less.

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8. The 3-5 group compound semiconductor according to Claim wherein an n-type dopant is planar-doped in at least one layer of said two kinds of layers.

? 9. The 3-5 group compound semiconductor according to Claim 3 wherein an n-type dopant is planar-doped on the interface of at least one layer of said two kinds of layers.

10. The 3-5 group compound semiconductor according to Claim 8 (or 9) wherein said n-type dopant is Si and the planar-doping concentration of this Si is $1 \times 10^{14} \text{ cm}^{-2}$ or more and $5 \times 10^{12} \text{ cm}^{-2}$ or less.

11. A light-emitting element obtained by using the 3-5 group compound semiconductor of any of Claims 1 (to 10).

12. A method of measurement of dislocation density in epitaxial crystal comprising the steps of: irradiating an epitaxial crystal with laser light having a wavelength shorter than that corresponding to the bandgap energy of crystal composition; measuring the in-surface distribution of the peak intensity of thus-obtained photo-luminescent light; and calculating the dislocation density ($N \text{ cm}^{-2}$) from the number (n) of dark spots or dark lines and the area ($S \text{ cm}^2$) of measurement region, according to the following formula (I).

$$N=n/S \quad (I)$$

13. A method of measurement of dislocation density, according to Claim 12, wherein the epitaxial crystal is composed of a plurality of layers, and the dislocation density is calculated for each layer.

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